CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1. (Original) A defect detection system for detecting a defect in a structure, said system comprising:

a sound source for applying a sound input signal to the structure, said sound source being coupled to the structure in a manner so that the sound signal induces acoustic chaos in the structure that causes the structure to vibrate in a chaotic manner and heat the defect; and

a thermal imaging camera for generating thermal images of the structure to identify the heated defect.

2. (Original) The system according to claim 1 wherein a force is applied to the sound source to couple the sound source to the structure in a manner that generates the acoustic chaos in the structure.

3. (Original) The system according to claim 1 further comprising a coupler in contact with the sound source and the structure, said sound signal being coupled to the structure through the coupler, said coupler being made of a predetermined material and having a predetermined thickness that act to induce the acoustic chaos.

4. (Original) The system according to claim 3 wherein the coupler is a

non-linear coupler.

5. (Original) The system according to claim 3 wherein the coupler is selected from the group consisting of copper, automotive gasket material, leather, duct tape, Teflon, paper products and cork.

6. (Original) The system according to claim 1 wherein the sound source includes a chaos signal generator and a transducer, said chaos signal generator generating a chaos signal that is applied to the transducer, said transducer causing the structure to vibrate in a chaotic manner.

7. (Original) The system according to claim 1 wherein the sound source includes an ultrasonic transducer, said ultrasonic transducer including a transducer horn that is coupled to the structure, and wherein the sound input signal generated by the ultrasonic transducer causes the transducer horn to impact against the structure.

8. (Original) The system according to claim 1 wherein the sound source includes an electromagnetic acoustic transducer.

9. (Original) The system according to claim 1 further comprising a device for determining vibrations of the structure in response to the sound input signal.

10. (Original) The system according to claim 9 wherein the device is a

doppler laser vibrometer.

11. (Original) The system according to claim 9 wherein the device is a microphone.

12. (Original) The system according to claim 1 wherein the acoustic chaos is defined by a range of frequencies providing a vibrational waveform whose spectral content is related to the frequency of the sound input signal by ratios of rational numbers.

13. (Original) A system for creating acoustic chaos in a structure, said system comprising a sound source coupled to the structure under a predetermined force, said sound source applying a pulsed sound signal to the structure, wherein the amount of force, the duration of the pulsed sound signal and the frequency of the sound signal act to induce acoustic chaos in the structure and cause the structure to vibrate in a chaotic manner.

14. (Original) A defect detection system for detecting a defect in a structure, said system comprising:

an electronic chaos signal generator for generating a chaos signal;

a broadband transducer responsive to the chaos signal from the chaos signal generator; and

a coupler coupling the transducer to the structure, wherein the transducer converts the chaos signal to a sound signal that is applied to the structure through the coupler, wherein the sound signal induces acoustic chaos in

the structure that acts to heat the defect.

15 –34. Cancelled.

35. (Previously Presented) The system according to claim 1 wherein the sound input signal applied to the structure is a pulse signal having a pulse duration and frequency that act to induce the acoustic chaos in the structure.

36. (Previously Presented) The system according to claim 10 wherein the vibrometer is a doppler laser vibrometer.

37. (Previously Presented) The system according to claim 1 wherein the sound input signal has a frequency of about 15-40 kHz.

38. (Previously Presented) The system according to claim 13 further comprising a mechanical coupler in contact with the source and the structure, said sound signal being coupled to the structure through the coupler, said coupler being made of a predetermined material and having a predetermined thickness that act to induce the acoustic chaos.

39. (Previously Presented) The system according to claim 38 wherein the coupler is a non-linear coupler.

40. (Previously Presented) The system according to claim 13 wherein the sound source includes an ultrasonic transducer, said ultrasonic transducer

generating a pulsed ultrasonic signal.

41. (Previously Presented) The system according to claim 14 further comprising a thermal imaging camera for generating thermal images of the structure to identify the heated defect.

42. (Previously Presented) The system according to claim 14 wherein the chaos signal from the electronic chaos signal generator is applied to a power amplifier that amplifies the signal before it is applied to the broadband transducer.

43. (Previously Presented) A defect detection system for detecting a defect in a structure, said system comprising:

an ultrasonic transducer for applying an ultrasonic pulse signal to the structure, said transducer being coupled to the structure under a predetermined force, said ultrasonic pulse signal having a pulse width and frequency, wherein the predetermined force, the frequency of the ultrasonic signal and the pulse width of the ultrasonic signal are selected so that the ultrasonic signal induces acoustic chaos in the structure that causes the structure to vibrate in a chaotic manner and heat the defect; and

a thermal imaging camera for generating thermal images of the structure to identify the heated defect.

44. (Previously Presented) The system according to claim 43 further comprising a mechanical coupler in contact with the transducer and the structure, said ultrasonic signal being coupled to the structure through the coupler, said

coupler being made of a predetermined material and having a predetermined thickness that act to induce the acoustic chaos.

45. (Previously Presented) The system according to claim 44 wherein the coupler is a non-linear coupler.

46. (Previously Presented) The system according to claim 43 wherein the acoustic chaos is defined by a range of frequencies providing a vibrational waveform whose spectral content is related to the frequency of the ultrasonic pulsed signal by ratios of rational numbers.

47. (Previously Presented) The system according to claim 43 further comprising a device for determining vibrations of the structure in response to the sound input signal.

48. (Previously Presented) The system according to claim 47 wherein the device is a vibrometer.

49. (Previously Presented) The system according to claim 47 wherein the device is a microphone.

50. (Previously Presented) A method for detecting defects in a structure, comprising:

applying a sound input signal from a sound source to the structure, said sound source being coupled to the structure in a manner so that the

sound signal induces acoustic chaos in the structure that causes the structure to vibrate in a chaotic manner and heat the defect; and

thermal imaging the structure to identify the heated defect.

51. (Previously Presented) The method according to claim 50 further comprising applying a force to the sound source to couple the sound source to the structure in a manner that generates the acoustic chaos in the structure.

52. (Previously Presented) The method according to claim 51 further comprising measuring vibrations from the structure.

53. (Previously Presented) The method according to claim 51 further comprising coupling the sound signal from the sound source into the structure through a coupler in contact with the source and the structure.

54. (Previously Presented) The method according to claim 51 wherein coupling the sound input signal to the structure includes coupling a sound input signal into the structure that has a pulsed duration and frequency that act to induce the acoustic chaos in the structure.